

REMARKS

Claims 1-17 remain in the application, the claims having been amended for clarity.

Applicant notes with appreciation the indication of patentable subject matter recited in claim 10, but respectfully requests reconsideration of the application and allowance of all claims in view of the above amendments and the following remarks.

The rejection of claims 1, 5, 11, 12 and 16 is respectfully traversed.

The present invention is directed to an improved technique for re-routing a path in the event of a path failure in a MS-SPRing network. In a network to which the invention is directed, there are a plurality of network elements connected together in a ring via fiber spans, with each span having low priority and high priority channels. According to the invention, a time slot interchange (TSI) mechanism is provided whereby a path can be routed through different high priority time slots in different spans. Each time slot is associated with an index (e.g., #1 to #16 in the disclosed embodiment). The high priority channels may be assigned indexes 1 to 8, and the low priority channels assigned indexes 9 to 16. This will result in each high priority channel having a corresponding low priority channel. When a span fails, e.g., span 2-3 in Fig. 1, the high priority channel coming from node 1 in time slot #2 will be bridged over to a low priority time slot going back toward node 1 (see, e.g., Fig. 3). The time slot chosen is the time slot #9. The mechanism for this choice is that in the failed span, the channel being re-routed would have occupied time slot #1 in the span 2-3. The low priority time slot in span 2-3 that corresponds to the first high priority time slot #1 is the first low priority time slot #9. So this is chosen. All of the nodes 4-6 are in "pass-through" mode so that the re-routed channel appears at the right side of node 3 also on time slot #9. So at both ends of the failed span, the low priority time slot used

is the time slot which is the same index as the time slot in the failed span which corresponds to the high priority time slot that would have been used in the failed span.

On the other side of the failure, the channel occupying time slot #6 would have occupied time slot #3 in the failed span. The low priority time slot corresponding to this is time slot #11, so the traffic is bridged to the time slot #11 going back toward node 4 and then continuing on around to the left side of node 2.

Note that the re-routing time slot chosen in the span 1-2 is not the time slot with the same index value as the failed high priority time slot in span 2-3. This cannot be done because in a TSI system that high priority time slot might be used elsewhere around the ring for a different channel.

According to the examiner's own characterization of Usuba et al, a protection transmission line is used that has the same time slot number as the working transmission line. But this is in the context of a working channel and protection channel in the same span, e.g., if working channel #1 fails between node D and Node E in Fig. 2, a protection channel #1 between those same two nodes is used. This is not ring switching of the type to which the present invention is directed.

In the illustration of Fig. 3 of Usuba et al, there is a complete failure of the span between nodes D and E, and ring switching is used. But the signals on working channel #1 coming into node D are re-routed back toward node C on protection time slot #1. There is no discussion in Usuba et al about how this time slot is chosen, and it appears that it would be chosen based on the time slot in the non-failed span that has to be accommodated. Instead of using the allocated time slot of the non-failed span as the basis for determining the time slot to be used for re-

routing, the present invention uses the time slot which would have been used in the failed span as the basis for selecting the time slot to be used in adjacent spans for re-routing. This is not suggested in Usuba in a ring switching environment.

The rejection of claims 2, 6-9, 13 and 17 for obviousness over Usuba et al in view of Ellinas et al is respectfully traversed.

Ellinas et al does not teach what is missing from Usuba et al, i.e., in a ring switching environment, selecting the re-routing time slot based on the time slot which would have been used in the failed span. Applicant does not contest that when two spans fail the paths have to be re-routed somehow, but this is all that Ellinas et al teaches that is relevant to the present invention. There is no discussion whatsoever as to which of plural possible protection time slots should be chosen, and that is a central point of the present invention.

For claim 2, note that the basic invention of claim 1 calls for reliance on the allocated time slot of the failed span as the basis for selecting the protection path to be used in the non-failed span. The question then arises what criteria to use if there are plural failed spans. This is only a problem if multiple failures leads to ambiguity in selecting a protection time slot, and that only happens if the choice of protection time slot is somehow based on the failed span. Usuba et al does not care how many spans have failed, because it appears to be choosing the time slot corresponding to the slot in the non-failed span that needs to be handled, e.g., time slot #1 on the non-failed span is re-routed over protection time slot #1 on the non-failed span. Ellinas does not suggest any reason to do otherwise.

Regarding claim 6, the examiner points to Ellinas as teaching using the same index for working and protection time slots, but that is not what is claimed. Claim 6 calls for use of a

protection time slot on the non-failed span with index corresponding to the index of a high priority channel on the failed span. Ellinas talks only about using the same index numbers for working and protection finders on the same span.

Regarding claim 7, it is to be again noted that this claim is talking about how the selection is made of which failed span to use as the basis for assigning protection time slots to be used in re-routing over non-failed spans. Usuba does not require such a choice, and Ellinas does not differ.

The rejection of claims 3 and 14 for obviousness over Usuba et al in view of Chaudhuri is also respectfully traversed. Again, Chaudhuri neither teaches nor suggests the basic feature of the invention, which is using the high priority time slot number which would have been used in the failed span as the basis for selecting the re-routing time slot in non-failed spans, all in a Multiplex Section Shared Protection Ring network. Further, the excerpts cited by the examiner discuss the addition of appropriate delays to compensated for the use of longer protection paths, but have nothing to do with selecting a protection time slot having an identification number which bears some known relationship to the time slot number of the high priority time slot that would have been used in the failed span.

The rejection of claims 4 and 15 for obviousness over Usuba, Ellinas and Chaudhuri is respectfully traversed. As discussed above, none of the applied references teach the basic concept of selecting a protection time slot having an identification number which bears some known relationship to the time slot number of the high priority time slot that would have been used in the failed span.

Amendment Under 37 C.F.R. § 1.111
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In sum, a central point of the invention is how one chooses which time slot to use when re-routing paths, and the cited references are silent on this. In its broadest aspect, the present invention resides in the selection of a protection time slot based on the time slot which would have been occupied in the failed span. This is simply not discussed or otherwise suggested in the cited art.


In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Respectfully submitted,



David J. Cushing
Registration No. 28,703

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